VOL. XLI, No. 12 **Concrete** DECEMBER, 1933

Use Ultra-Modern Methods in Mississippi River Dam

Bulk Cement Received in Gravity-Unloading Railway Hopper Cars, and Pumped from Cars to Bins — Pump Distributes Concrete Through 7-Inch Pipe Line

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THE construction of the locks for Mississippi River Dam No. 4, near Alma, Wisconsin, has utilized three developments in concrete construction that are new or comparatively new.

Three Special Construction Features

Taking these features in their logical order, the first consisted of the shipment of 70,000 bbl. of cement, direct

Gravity-unloading railway hopper cars deliver bulk cement direct from mill

from the mill to the construction site, in covered bulk-cement railway hopper cars. The second feature was the installation for pumping the cement from the railway siding to the storage bins of the concrete mixing plant, 350 ft. away. Finally, the concrete was distributed by a recently developed concrete pump, which delivered from 50 to 60 cu. yd. an hour through a 7-in. pipe line through a maximum distance of 1,120 ft.

Gravity-Unloading Cars Deliver Bulk Cement

The covered railway hopper cars which transported the bulk cement from the Lehigh Portland Cement Company's plant at Oglesby, Illinois, were the type described and illustrated on page 18 of the October (1932) issue of CONCRETE. The average cargo was 330 bbl. of cement to the carload.

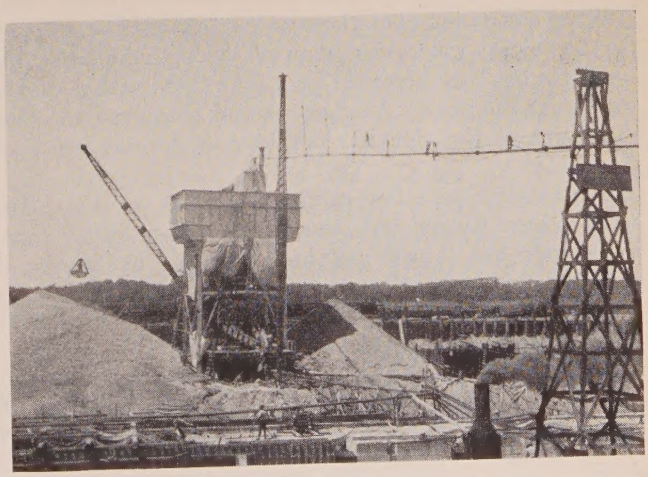
As explained in the article just mentioned, these cars are the gravity-unloading type, and are, in fact, converted hopper cars originally built for the shipment of coal. The rebuilding of the coal cars involved the construction of a watertight roof fitted with eight covered hatches sealed by means of a locking pawl, and the construction of a transverse bulkhead or diaphragm at the mid-point of the car body.

These bulk-cement cars are also fitted with new hopper outlets designed especially for the outflow of cement and similar pulverized or granulated commodities; and there are other minor accessory fittings.

One exception to the cars just mentioned must be noted. This was a newly developed gravity-unloading hopper car designed and built especially for the shipment of materials such as bulk cement. This new car follows, in general, the principles utilized in the converted coal cars, except that the slope of the hopper bottoms is steeper.

Facilities for Unloading Cement

The facilities provided for unloading the bulk cement at the construction site was similar to the installations usu-



Cement pump at railway siding delivers bulk cement through overhead pipe line, to bins at concrete mixing plant

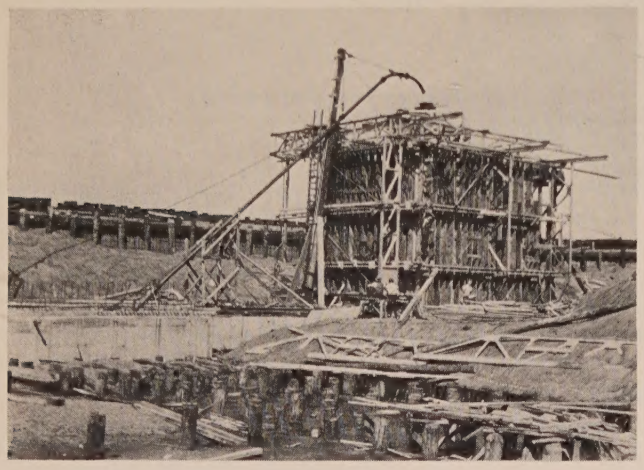
ally employed for the purpose. The mechanism of the unloading installation is very simple. Two of the track ties of the railway siding were separated a greater distance than usual, and the space between ties was excavated to provide room for the insertion of a short screw conveyor beneath the rails.

By spotting the cars properly, the cement was discharged directly into the screw conveyor, which in turn carried the cement a short distance horizontally and discharged into a Fuller-Kinyon cement pump.

Pump Cement to Mixing Plant

The Fuller-Kinyon installation pumped the cement through a 4-in. pipe line for a horizontal distance of 350 ft. and a vertical lift of 40 ft., discharging into the cement bins over the concrete mixing plant.

A similar method of delivering bulk cement from the railway siding to the construction site is described on pages 7-9 of the March (1932) issue of CONCRETE.



Concrete was pumped into the forms, through a maximum horizontal distance of 1,120 ft., through the 7-in. pipe line here shown

From the mixing plant the concrete was delivered to the forms through a 7-in. pipe line, by means of a pumping installation known as the "Pumpcrete" system.*

The concrete was pumped through a maximum horizontal distance of 1,120 ft. and a maximum vertical lift of 43 ft. The installation delivered from 50 to 60 cu. yd. an hour.

When concreting operations were interrupted or stopped for the night, water was pumped through the pipe, the water having been preceded by a plug fitted with a rubber washer at each end. Another method employed to clean the inside of the pipe line consisted in forcing excelsior through it.

The concrete pipe line consisted of 10-ft. sections. The sections have flanged ends, faced with rubber washers, and these ends are joined and held together by means of couplings of the toggle type. Curved sections, bent on a 5-ft. radius, were provided for making turns.

Slump of 2 to 3 Inches

The concrete pumped through the pipe line totalled about 57,000 cu. yd. The slump of the concrete ranged from 2 to 3 in., though at times the mixture was even drier.

Coarse aggregate up to the 3-in. size was used, since the pump valve permits the passage of this size of material.

A part of the concrete was placed by ordinary puddling methods, while a considerable amount was placed with vibrators having a frequency of 3,600 r.p.m.

The construction project utilized 57,000 cu. yd. of concrete in the locks, while the dam will require about 37,000 cu. yd. Cement requirements in the locks amounted to about 70,000 bbl., and the dam will consume about 45,000 bbl.

Acknowledgments

Contracts for the locks and the dam have been awarded separately. The work here described and illustrated comprises the contract for the locks only, this work having been awarded to the Ouilmette Construction and Engineering Company. The locks have now been completed. Contract for the dam was awarded in October, to the United Construction Company of Alma, Wis. The writer is serving as general superintendent of construction on both contracts.

The concrete pumping equipment was manufactured by the Chain Belt Company, of Milwaukee, Wisconsin.

The project comprising Lock and Dam No. 4 was designed by the U. S. Engineer Office at St. Paul, Minn., under the direction of Major Dwight F. Johns, district engineer at St. Paul. The St. Paul office is within the jurisdiction of the Upper Mississippi Valley Division office at St. Louis, Colonel George R. Spalding, division engineer.

*This method of distributing concrete is described and illustrated on pages 3-4 of the September (1933) issue of CONCRETE.

Monolithic Concrete Water Tower Is Architectural Masterpiece

THIS reinforced concrete water tower, built in the Washburn Park residential section of Minneapolis, is a notable example of the adaptability of concrete to architectural treatment.

Built for a utilitarian purpose, proper attention to the principles of architecture made this structure a distinct credit to the city. The tower was designed by W. S. Hewett, of Minneapolis.

Water tower demonstrates value of concrete as architectural medium

Prudential's Newark Housing Project Is of Concrete Construction

Structural Frame and Floors of Reinforced Concrete—Walls of Concrete Sections—Plywood Forms Eliminate Ceiling Plaster—Rent $9.00 Per Room

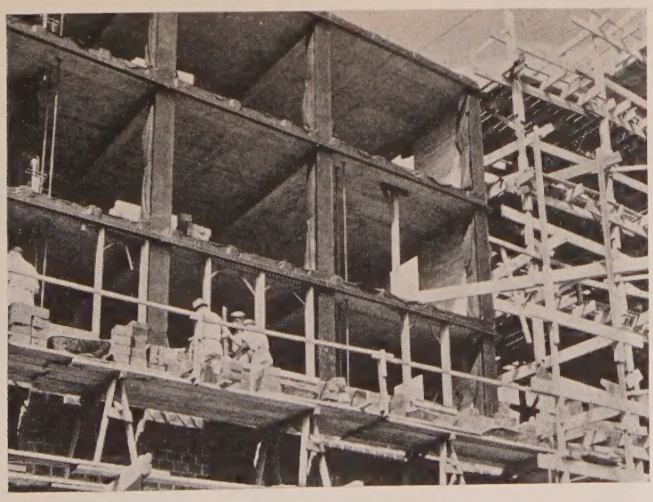
MODERN housing for low income groups—an idea close to the ambitions of the New Deal—is obviously important and socially desirable. It may also turn out to be good business, providing permanent economy is assured by sound design and construction.

The Prudential Insurance Company of America is making a definite attack on the problem in its Third Ward development in Newark, N. J. In a section predominantly Negro in population, a six unit project is now nearing completion. It will house 374 families in two, three and four-room apartments, all walk-up. Two of the buildings are six stories high; the other four are five floors each.

Fireproof Construction and Low Maintenance Expense

In approaching the problem of multi-unit low-cost housing, Prudential laid down two basic considerations, closely related. First, firesafe construction, and second, construction of a type that would insure unimpaired usefulness over a long period, at the least possible maintenance expense. The cost factor naturally fluctuated as various types of construction were considered. To class as a low-cost housing project in this particular community, cost had to be limited to a figure which would permit an average monthly rental of not more than $10.00 per room.

After serious consideration of two other structural types, it was decided to use a reinforced concrete structural frame, with concrete slab floors and concrete sectional walls. Exterior finish is brick blocks, with faces 5 by 8 in., in combination with ornamental black cast stone spandrels between stairway levels.



Structurally, the apartments are of reinforced concrete, with concrete sectional walls and concrete slab floors

Prudential's own architect-engineer, Edmund C. Stout, worked out the design with the New York architectural firm of Voorhees, Gmelin and Walker as consultants. In carrying out the design in actual construction, the Walter Kidde Constructors, Inc., of New York, found that the numerous economies contemplated in the design were entirely practicable. For example, by casting the floor slabs on plywood forms, the lower surfaces stripped so smoothly that no ceiling plaster was necessary. One coat of neutralizer, plus a finish coat of paint produced a perfectly smooth and attractive ceiling. The concrete floors are covered with hardwood in all rooms except baths and in the stair wells, where slate and non-slip tile are used.

Narrowness of buildings permits sunlight and air to reach every apartment

Six Buildings Arranged in Two Rows

The general layout of the six buildings is most unusual, suggesting a plan capable of adaptation to other communities. The units are arranged in two rows, each row consisting of one long, six-story building flanked by two short five-story buildings. The rows are about 700 ft. long and 26 ft. deep. Thus, the two units are arranged to face each other from either side of a plot 700 by 200 ft. The open space or park area between the two rows of buildings is about 147 ft. wide.

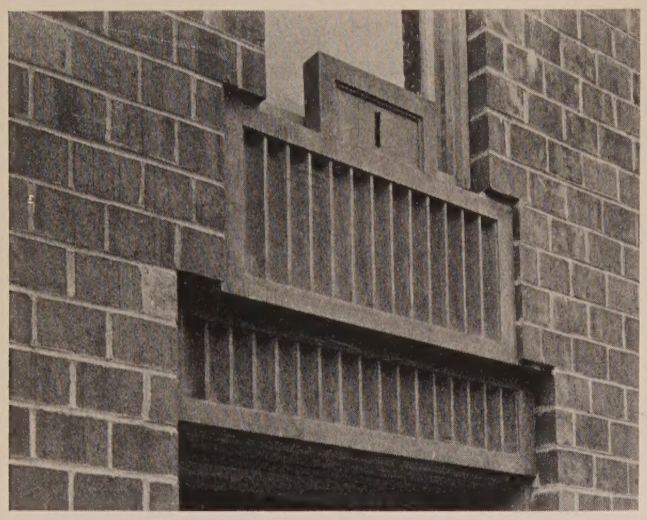
Park Area Developed by City

The park area between the two rows has been acquired by the City of Newark and will be transformed by it into a recreational center, not only for the use of those in the Prudential buildings but for the whole neighborhood. To emphasize the fact that the play space is for general use, the entrances to the several buildings are all on the streets, not on the park side.

The row system, with its lack of courts and angles, pro-

duces the greatest possible privacy for each apartment and largely eliminates the annoyance of neighborly noises.

The total cost of this project is about $800,000—a total which works out at a cubage rate of approximately 40



The only exterior decoration consists of black precast concrete over each entrance and between stair-landing windows

cents. With individual gas ranges and electrical refrigerators installed, in the total cost, apartments can be—and are being—rented on an average of about $9 per room.

Incidentally, a large proportion of the applications for apartments are being made by white people, despite the fact that the district is predominantly colored. Segregation of racial groups is being considered as a solution of the racial problems involved.

While no room in any of the apartments is larger than 12 ft. square, the arrangement of rooms is simple, direct and eminently livable. Most of the apartments have two exposures and cross ventilation; all have large windows. Dumb-waiter shafts serve each family unit.

It will be seen that all suggestion of slum conditions has been effectively eliminated. Sanitary equipment is modern and complete. Above all, the Third Ward development is firesafe. According to Mr. Stout, this is the first low-cost housing project to be completely fireproof.

Concrete Best Construction Material

A group of some fifty architects, engineers and builders recently inspected the Third Ward development, as guests of the Walter Kidde Constructors. After a luncheon, the visitors inspected the work and agreed almost unanimously, according to a report in the New York Sun, that reinforced concrete was the structural material with which most of the future low-rent housing developments would be built.

"The effect produced by the buildings," said the Sun, "was very pleasing and it was pointed out that concrete was not only vermin-proof, but would be free of cracked ceilings, sagging floors and doors and other defects that the semi-fireproof buildings are subject to."

Completion of the entire project is expected about January first with 100 per cent occupancy assured.

Permanent Outdoor Terrazzo Exhibit

Esplanade at Century of Progress to Be Left in Place—Forms Approach to Planetarium

THE National Terrazzo and Mosaic Association's exhibit at the Century of Progress Exposition in Chicago is one of the few exhibits that are to remain in place.

Because of the absence of a suitable approach to the Adler Planetarium, a permanent park building, the association suggested the construction of an esplanade of terrazzo to be left in place after the close of the exposition.

This unusual construction, designed by Ernest A. Grunsfeld, Jr., architect of the Adler Planetarium, consists of a symbolic central design representing the months of the year, and a promenade along each side.

The central feature, designed by John Norton and Thomas Lea, mural artists, and also executed in terrazzo, is blended in nearly fifty color tones. A thin sheet of water flowing over its accentuates the colors. In its richness and its variety of color and pattern the esplanade is a magnificent illustration of the possibilities of terrazzo.

Long Island's New Traffic Artery Avoids All Grade Crossings

Grade-Separation Structures Carry 21 Cross Streets Over 12-Mile Super-Highway—Accessory Features Provided—Place 418,000 Sq. Yd. of Concrete Slabs

A TYPE of highway construction that is certain to receive much attention in programs for metropolitan areas is represented by a recently completed traffic artery in Long Island.

Nearly 12 Miles of Concrete Super-Highway

The close-in part of this artery, having a length of 7.35 miles and involving 311,800 sq. yd. of concrete pavement, lies within the New York city limits and is known as Grand Central Parkway. The outer section, 3.81 miles long and totalling 107,000 sq. yd. of concrete pavement, is in Nassau County and is known as Northern State Parkway. To the motorist the two projects are one, with a total length of 11.16 miles and involving 418,800 sq. yd. of concrete slab.

This great metropolitan highway artery provides uninterrupted traffic from Kew Gardens to Willis Avenue, north of Mineola. The project consists of a 4-lane depressed parkway or boulevard, flanked on each side by a service road built at grade, while all unpaved portions of the right-of-way are landscaped.

All Grade Crossings Eliminated

The central pavement consists of a concrete slab 44 ft. wide and 8 in. thick. The concrete slabs of the service roads are 20 ft. wide and 9 in. thick.

The entire length of the central express boulevard is free from grade crossings, 21 grade-separation structures carrying cross streets over or under this main roadway. Public entrances to the more important cross streets are provided.

Accessory Facilities Provided

In addition to the roadways, the grade-separation structures and the landscaping, this project includes a number of gasoline filling stations, comfort stations, police booths, bridle paths, and pedestrian walks.

At its westerly end, at Kew Gardens, the new highway connects with Highland Boulevard in Brooklyn by way of the Interborough Parkway, and with the Triborough Bridge to the Bronx and Manhattan by way of Grand Central Parkway extension.

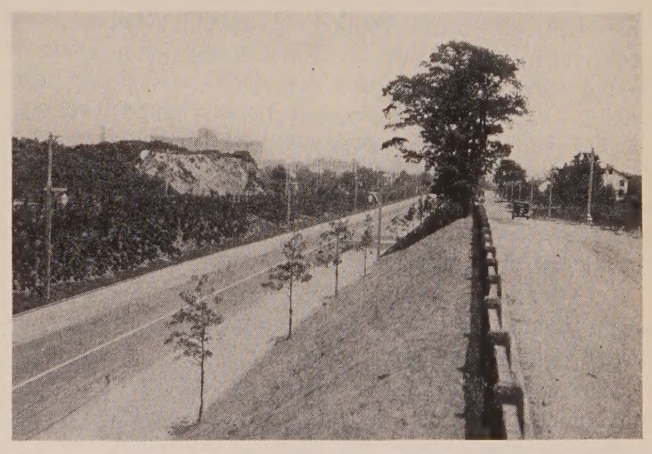
The right-of-way from Kew Gardens to the city limits was provided or acquired by the city of New York, and the right-of-way for the part known as Northern State Parkway was acquired by Nassau County and by dedication.

Construction Costs Five Millions

The State Department of Public Works and the Long Island State Park Commission were in charge of construction, which was financed by state and federal appropriations aggregating more than five million dollars. After all landscaping and accessory facilities are completed on the portion of the project lying within the city limits, the service roads on each side of the main roadway will be turned over to the Borough of Queens for maintenance. The main roadway will, similarly, be turned over to the department of parks of the Borough of Queens. The city will provide a special detail for policing the portion of the project within the city. The remaining portion lying outside the city limits, will continue to be maintained and policed by the Long Island State Park Commission.

Many Difficulties Overcome

From the foregoing it will be seen that from all points of view—financial, legal and construction—the problems encountered were complicated; yet all difficulties were overcome, the work has been completed, and traffic congestion has been relieved. The finished project stands as evidence of what may be accomplished toward the unscrambling of tangled traffic situations in metropolitan areas, when determined public officials apply themselves to the problem.



By courtesy of Long Island State Park Commission.

A 4-lane concrete pavement on a depressed right-of-way, and 2-lane service roads of concrete on each side, at grade, comprise main features of new traffic artery in Long Island

Annual Meeting of A. S. T. M.

The annual meeting of the *American Society for Testing Materials* in 1934, will be held at Chalfonte-Haddon Hall, Atlantic City, from Monday, June 25 through Friday, June 29. The Executive Comimttee has secured from the hotel management definite assurance of room rates which compare very favorably with those of other years.

Several subjects of much current interest are under consideration for inclusion in the technical program.

Cold Weather Construction Practice on Reinforced Concrete Work

The recommendations here given for protecting concrete work on an average building job during cold weather are taken from the standard practice of a large construction company, as published in a broadside recently issued by the Portland Cement Association.

These rules of procedure are equally applicable to structures such as bridges, viaducts, grade separations, sewage disposal plants, concrete tanks, retaining walls—in fact, they apply to all reinforced concrete work.—Editor.

1. The contractor shall furnish and install at the building a boiler capacity of at least 50 hp. licensed for 80-lb. steam pressure. This boiler capacity shall always be available for the sole purpose of supplying steam for cold weather protection.

2. All fine and coarse aggregate shall be entirely freed from frost and warmed either by storing in an enclosed space, properly heated; or, if not stored in an enclosed heated space, then by piling over perforated steam pipes having a diameter of 1½ in. and spaced about 4 ft. c. to c. or shall be heated by inserting 1½ in. perforated pointed steam pipes into the pile. The material piles shall be steamed during the day preceding the placing of concrete and while concreting, and shall be covered with canvas during the night preceding the placing of concrete.

3. All mixing water shall be heated by injecting live steam into the water barrel at the mixer through a pipe at least 1½ in. in diameter.

4. A steam line shall be carried up with the form work, and immediately before starting to place concrete all forms and steel reinforcing shall be thoroughly cleaned and warmed by live steam supplied through a steam hose.

5. Before starting to concrete the columns of any story or the floor supported by such columns, the contractor shall hang canvases to enclose the section of the story to be concreted, being careful to maintain an air space between the exterior faces of the concrete and the canvas curtains. Canvas curtains shall be well lapped to exclude wind and shall be large enough to reach well below the surface of the floor supporting the columns which are to be concreted.

6. Before starting to concrete, salamanders containing coke fires shall be placed inside the enclosure at proper intervals to maintain a temperature of about 70 deg. at the under side of the floor slab. This will generally require about one salamander of usual size to each 300 sq. ft. of floor space. One salamander shall be placed near each exterior column unless the temperature is below 20 deg., when two salamanders shall be placed, one each side of each exterior column. On windy days use two salamanders at each exterior column on windward side of building.

7. Holes about 8 by 12 in., one to about every 300 sq. ft., shall be formed through the floor slab by cutting holes in the floor form and inserting a wood frame in the concrete. These holes shall be made larger at the top of the slab than at the bottom of the slab in order to hold the concrete which will later be used to fill them. These holes permit hot air to rise into the space between the top of the slab and the canvas covers described in the next paragraph.

8. As rapidly as the floor slab is concreted it shall be covered by canvas covers well lapped and supported about 6 to 18 in. above the surface of the concrete by a framework supported on the wood frames around the heat openings or on the steel reinforcing rods which project above the floor line at columns. These top covers shall be well lapped over the side curtains.

9. Full continuous heat is to be maintained in each section for 110 hours after the concrete is placed, except should the outside temperature fall below 20 deg. the heating shall be continued for one day for each day on which the temperature falls below 20 deg., but not to exceed 2 additional days of 24 hours each.

10. When using beam and girder construction, top covers shall be kept in place for 48 hours, but with flat slab construction they shall be kept in place for 72 hours, except that top covers may be removed between 8 a. m. and 5 p. m. on days when the temperature is above 35 deg. to permit of setting column forms, but shall be replaced at 5 p. m.

Side covers shall remain in place as long as heat is continued, except that after 48 hours the curtains outside of exterior columns may be removed one at a time for only sufficient time to strip the forms from the exterior columns, after which they should be immediately replaced.

Road Builders' Meeting and Exhibit

The coming convention of the American Road Builders' Association will be held in Chicago, during the week of January 22, 1934. In connection with the convention a comprehensive exhibit of highway equipment and materials will be held. Four major subjects will engage the attention of the convention. They include—

(1) The need for continuation of an adequate highway program.

(2) The necessity for federal participation in the nation's road program.

(3) The use of highway revenues for the extension and improvement of the nation's highway network.

(4) The necessity for bringing back to the highway program all gasoline and motor license revenues which, during the period of economic stress, have been diverted to other purposes.

This meeting is the outstanding national event of the year in the highway industry and assumes even greater importance than ever at this time because of the relation of highways in the national recovery program.

Relative Surface Ratio as Expression of Fineness

By E. W. REED-LEWIS
Director of Research, The Super Cement Company, Detroit, Mich.

FOR many years, it has been conventional to refer to the fineness of pulverous materials, such as portland cement, in terms of the percentage residue on certain sieves. It has long been obvious, however, that the determination of a few per cent of accidental oversize material contributes but little to a knowledge of the significant fineness of the ninety odd per cent that frequently passes through the finest of standardized sieves.

Appreciation of this fact has led to the development of apparatus for studying sub-sieve particle size distribution by means of air elutriation or sedimentation, the operation of such apparatus depending primarily on an application of Stokes' Law.

With such apparatus, it is usually the practice to subdivide a sample into several "fractions," and to assign nominal particle size limits to each fraction. Actually, an accurate physical classification of the component particles into fractions having definite particle size limits is seldom, if ever, attained in the test procedure; nor is it by any means essential that it should be.

Test Procedure Must Be Systematized

The fractions into which the sample is subdivided may substantially overlap each other in particle size, and yet reflect the actual particle size distribution of the whole with ample fidelity—provided that the test procedure is categorically systematized, and the apparatus accurately calibrated against a "Standard Sample" of known particle size distribution. Unfortunately, these precautions have not been generally adopted; much confusion is the natural results.

One gram of portland cement represents an absolute volume equivalent to that of a sphere about one third of an inch in diameter. When this is pulverized to the fineness of some of the modern cements, it may be composed of as many as one thousand million particles, of irregular size and shape. To accurately classify these particles as to size, and determine what the classified sizes are in terms of mean particle diameters, is no mean task. For independent laboratories to undertake such a task individually, and expect to attain satisfactory concordance in results, is little more than a fond hope, besides involving unnecessary duplication of tedious effort. If, on the other hand, some central laboratory or bureau, of recognized standing, would undertake the task, and be prepared, for a suitable fee, to supply a "Standard Sample" of stated particle size distribution, it would be a comparatively simple matter for all laboratories to calibrate their apparatus on this simple, and substantial inter-laboratory concordance on sub-sieve fineness would at once be established.

An Expression of Fineness

A fineness analysis, expressed in percentages of several different particle size groups, is obviously cumbersome to deal with. It has seemed expedient, therefore, to attempt to consolidate the terms of such a fineness analysis into a single numerical value that would significantly express "fineness." An expression, now quite commonly used in connection with portland cements, is "Specific Surface," signifying "square centimeters of surface per gram weight," this value being calculated from the sub-sieve fineness analysis.

The ordinary conception of the meaning of the word "fineness," when applied to pulverous materials, is that it refers to the quality or condition of being "fine" with respect to the size or sizes of the component particles, quite irrespective of their mass or weight. If all cements had the same specific gravity, Specific Surface might well serve its present apparent purpose; but with the growing tendency toward blended cements for special uses, in which materials of radically different specific gravities are blended together in the grinding process, Specific Surface becomes a rather confusing term to use. There seems, moreover, to be no very good reason why an expression of fineness should not be adopted that would be generally applicable to all pulverous materials—instead of merely to portland cement.

For an expression of fineness to have general applicability, it is necessary that it be a purely dimensional function, unconfused by gravimetric factors. A simple expression that meets this requirement, is the ratio of "Surface" to "Absolute Volume."

Applies to Any Pulverous Material

This ratio could appropriately be termed the "Surface Ratio" of any pulverous material under consideration. For any size of particle of mean diameter "d," Surface Ratio is equal to 6/d. For pulverous materials in the range of fineness of cements, "d" would be conveniently expressed in microns.

To illustrate the essential difference between "Specific Surface" and "Surface Ratio," the following example can be taken, in which both of these functions are expressed for two hypothetical samples, one of silica and the other of corundum, each sample being entirely composed of particles of uniform size, 10 microns in mean diameter:

Sample	Specific Surface	Surface Ratio
Silica	2,264	0.600
Corundum	1,500	0.600

The Surface Ratio of any pulverous material having been reported, and its specific gravity being known, its Specific Surface, if desired, could be derived from the following equation:

$$\text{Specific Surface} = \frac{\text{Surface Ratio} \times 10{,}000}{\text{Specific Gravity}}$$

Conversely

$$\text{Surface Ratio} = \frac{\text{Specific Surface} \times \text{Specific Gravity}}{10{,}000}$$

It will be apparent, from the foregoing, that if the specific gravity of a material is not definitely reported, any

reference to its fineness in terms of Specific Surface is unintelligible. On the other hand, if the Surface Ratio of a material is reported, its fineness is definitely indicated, regardless of what its specific gravity may happen to have been.

The Need for Standardized Practice

Reference has already been made to the advantage of calibrating all apparatus on a "Standard Sample" of stated particle size distribution. A desirable first step towards standardized practice would be to agree definitely on the nominal separation sizes to be used in reporting a sub-sieve fineness analysis. If fineness is to be expressed in terms involving the factor of surface, equally definite agreement on what mean particle size to assign to each size group would be an essential coincident step.

No matter whether Specific Surface or Surface Ratio be used, reported fineness values should be based on procedure that follows well defined and generally accepted rules. As long as each investigator develops and uses his own set of rules, and takes no particular pains to record clearly what they are, reported data will continue to be unintelligible, except, perhaps, to the investigator and his immediate associates.

At the present time, most investigators make no attempt to subdivide below a nominal particle size of 10 microns; there are some, however, who undertake further subdivision at 7½, and even 5 microns.

To illustrate the need for some standardization of practice in this particular connection, it will be assumed that two laboratories are dealing independently with a sample in which the fraction finer than 10 microns is so graded as to particle size that 50 per cent of its absolute volume is composed of particles finer than 5 microns, and 50 per cent of particles between 5 microns and 10 microns in mean diameter. It will be further assumed that Laboratory "A" makes no attempt to subdivide the "finer than 10 microns" fraction, and merely assigns to it a mean particle size of 5 microns, while Laboratory "B" accurately subdivides this fraction at 5 microns, and assigns mean particle sizes of 2½ and 7½ microns to the respective subdivisions. Each laboratory would then calculate either Specific Surface or Surface Ratio for the whole "finer than 10 microns" fraction with the following rather discordant results:

	Specific Surface (s.g. 3.15)	Surface Ratio
Laboratory "A"	3,810	1.200
Laboratory "B"	5,079	1.600
Difference	33.3%	33.3%

Assumptions Necessary

It has been pointed out that most apparatus presently in common use for studies of sub-sieve particle size distribution depend primarily on an application of Stokes' Law. There is a growing conviction that this law does not exclusively govern the motion of particles of a size much below 10 microns in mean diameter. It follows that the apparatus cannot be relied on to disclose particle size distribution accurately in this lower range. It is equally out of the question, as a routine test procedure, to explore this finest fraction microscopically, in order to arrive at its mean particle size by frequency counts of the different sizes of its component particles. The alternative seems to be, having decided on the nominal separation sizes that are to be used, to adopt arbitrary mean particle sizes for each of the resulting fractions, these arbitrary values, by common consent, to be used in all calculations of either Specific Surface or Surface Ratio.

Deciding on what these arbitrary values should be, is not a problem to be lightly undertaken, particularly in connection with the finest fraction of a fineness analysis, the range of which is usually, rather whimsically, defined as having "zero" as its lower limit of particle size.

The overwhelming importance of this finest fraction, in seeking to express "fineness" in any terms involving "surface," will perhaps be better appreciated when it is recognized that from 60 to 80 per cent of the total surface of a pulverous material in the fineness range of modern portland cements probably lies in that portion composed of particles substantially finer than 10 microns in mean diameter.

The necessary assumption of a mean particle size value for this finest fraction should therefore be based on carefully observed facts. It should be an empirical assumption, rather than a quasi-theoretical one.

Since assumptions are necessarily involved, any expression of fineness in terms involving surface should be considered as a relative value, rather than an absolute one. It would therefore seem preferable to refer to the "Relative Surface Ratio" of a material, rather than to its "Surface Ratio;" "Relative Specific Surface," rather than "Specific Surface."

"Relative Surface Ratio," if its determination were adequately standardized, would permit comparison of the relative fineness of different materials, regardless of any differences in their specific gravities; conceivably, such an expression would find useful application.

Illustrative Example

To illustrate the computation of "Relative Surface Ratio," the following example is given, using tentative separation sizes, and tentative mean particle sizes for each size group. In this example, the 60 and 120-micron size separations are intended to represent the separation sizes of the No. 325 and No. 200 sieves, respectively.

Size Group	Mean Particle Size "d"	6/d	Fineness Analysis	Product
Finer than 10 mu.	6.0 mu.	1.000	.430	.4300
10 to 15 mu.	12.5 mu.	0.480	.089	.0427
15 to 20 mu.	17.5 mu.	0.343	.065	.0223
20 to 30 mu.	25.0 mu.	0.240	.162	.0389
30 to 60 mu.	45.0 mu.	0.133	.182	.0242
60 to 120 mu.	90.0 mu.	0.067	.062	.0041
Coaser than 120 mu.	Negligible		.010	.0000
Relative Surface Ratio				0.5622

Coming Conventions

***December 4-6*—American Society of Agricultural Engineers. Technical meetings. Stevens Hotel, Chicago. Raymond Olney, Secy., St. Joseph, Mich.**

***December 7-8*—Highway Research Board, annual meeting. National Academy of Sciences, Washington, D. C.**

***January 22-27*—American Road Builders' Association. 31st annual. Chicago, Illinois.**

***February 20-22*—American Concrete Institute, thirtieth annual convention. Royal York Hotel, Toronto, Canada.**

***June 25-29*—American Society for Testing Materials. Annual. Chalfonte-Haddon Hall, Atlantic City, N. J.**

Housing Conference Lines Up Forces to Push Residential Building

A UNIFIED, nationwide policy on housing was adopted at the closing session of the two-day conference of the National Association for Better Housing, held at the Union League Club, in Chicago, on October 31 and November 1.

A group of fifty civic, social and business leaders was appointed as a governing council.

Establishment of a Federal mortgage discount bank to function in the field of long term credit, as does the Federal Reserve Bank for short term credit, was urged in the report of the conference finance committee, which was adopted unanimously.

The emphasis on planning as shown in the report of the finance committee, and the same element found in the housing plan being used at Euclid, Ohio, explained by Mayor Charles R. Ely, of that city, was commended by Robert D. Kohn, chief of the Housing Division of the Public Works Administration at Washington, who attended the conference.

Five-Point Plan Adopted

The five-point housing plan, which the conference turned over to the governing council for action, was as follows:

1. That there be established some agency for serving as a clearing house of information between the several branches of the industry.

2. That steps be taken at once to institute a market study of the home building field, with a view to ascertaining in a thorough and scientific way the nature of the public's wishes as to the kind, type and location of homes desired.

3. That a special committee be promptly established to consider what steps may be taken to speed up greatly the volume of modernization and rehabilitation to be done during this coming winter. It is felt that this type of activity offers possibilities of job-making that have an especial appeal at this time.

4. That particular attention be given to extending the type of housing project proposed by Mayor Ely, of Euclid, Ohio, and approved before the conference by Robert D. Kohn, federal housing director.

5. That the relation of housing to community planning be emphasized and in order to facilitate the development of comprehensive community plans, the conference respectfully recommends to the federal Public Works Administrator that the function of planning itself be recognized as a public work, and as such eligible to receive grants and loans such as public works that involve physical construction can now obtain.

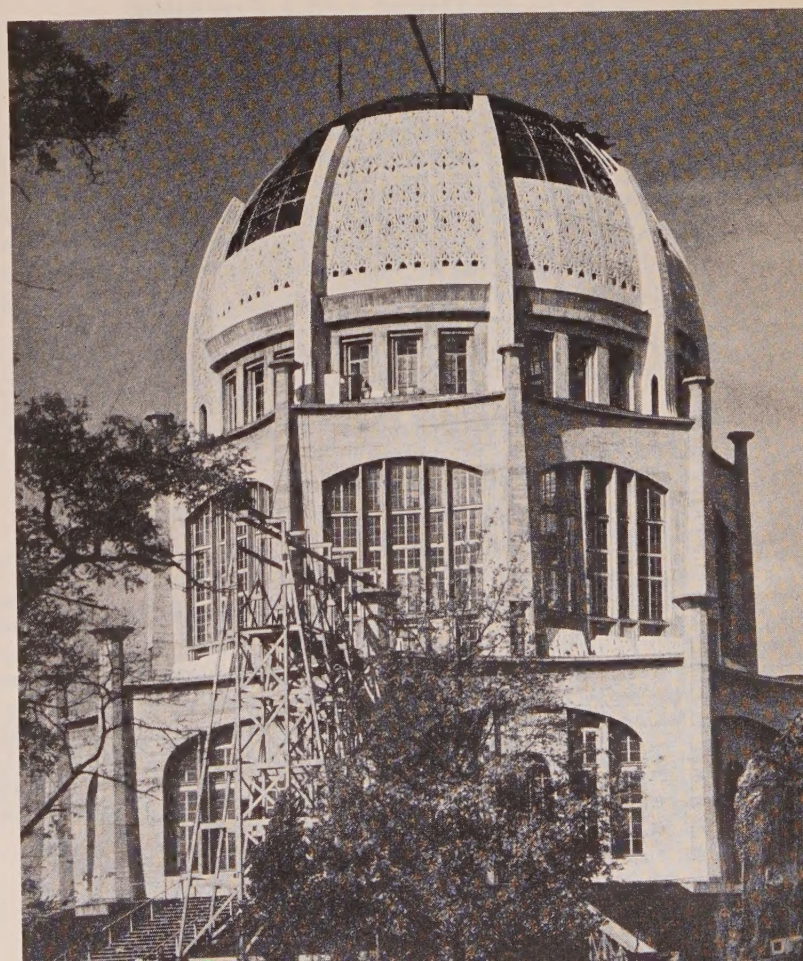
Placing Precast Concrete Tracery on Dome of Baha'i Temple

AN illustrated article in the May (1931) issue of CONCRETE, pages 11-13, described the placing of the structural concrete and construction of the structural frame of the famous Baha'i Temple, in Wilmette, Illinois, a suburb of Chicago.

Construction of this temple has proceeded slowly, as funds have become available. Now the dome ornamentation, the most striking feature of the building, is being placed. It consists of sections of precast concrete tracery, executed in symbolic designs, both on the interior and the exterior. When this work is completed the steel framework of the dome will have disappeared from view.

At some later time the remaining parts of the exterior will be covered with additional symbolic designs in concrete.

The ornamental concrete work on this unequaled example of architectural concrete is in charge of John J. Earley, architectural sculptor, Washington, D. C.



Baha'i Temple, Wilmette, Illinois, foremost example of architectural concrete

PROGRESS—In a Page

Current activities in research, in matters pertaining to concrete and cement, as being carried on or completed by various organized groups.

Changes in A. S. T. M. Standards

FOLLOWING are statements of recent revisions or changes in status of the A. S. T. M. tentative standards indicated.

Concrete Masonry Units.—The tentative standard covering this material has been revised by Committee C-10. The title and new serial designation are given as Load-Bearing Concrete Masonry Units (C90-33T).

Ready-Mixed Concrete.—Final approval as a tentative standard has been accorded to the specification for ready-mixed concrete, known as Concrete, Ready-Mixed (C94-33T). This standard was prepared by a subcommittee of Committee C-9, as noted on page 12 of the August (1933) issue of CONCTETE.

Concrete for Pavements.—Under the title and serial designation of Concrete for Pavements (D366-33T), this specification has been given final approval as a tentative standard.

Test of Absorption by Aggregates.—Development of two tentative standards covering this subject was mentioned on page 12 of the August (1933) issue of CONCRETE. Both of these test methods have been accorded the status of tentative standard, and are to be known as Test for Absorption by Aggregates for Concrete (C95-33T), and Field Test for Absorption of Mixing Water by Aggregates for Concrete (C96-33T).

A. S. T. M. Issues 1933 Triennial Book of Standards

THE American Society for Testing Materials has issued its Book of A. S. T. M. Standards, a triennial publication containg all of the standard specifications, methods of test, recommended practices and definitions formally adopted by the Society. The 1933 issue of this publication is composed of two parts—Part I containing all A. S. T. M. standards covering metallic materials; Part II, all standards relating to non-metallic materials. Both parts aggregate 2,300 pages.

Among the 285 standards in Part II will be found all test methods and specifications covering cement, lime, gypsum, masonry building units, refractories and fire brick, pipe and drain tile, concrete and concrete aggregates, and waterproofing materials. Reinforcement is covered in Part I.

Copies can be obtained from the A. S. T. M., 1315 Spruce St., Philadelphia, at $7.50 for Part I or Part II, or $14.00 for both volumes.

Reducing Hazard of Icy Pavements

A RECENT statement credited to B. C. Tiney, formerly engineer of maintenance, Michigan State Highway Department, again reminds highway engineers of the necessity of taking prompt steps to reduce the hazards arising from icy roads and pavements. This condition is especially dangerous in roads in hilly country.

The method recommended is to spread an abrasive material, such as coarse sand, fine gravel or crushed stone, slag or cinders, over the icy surface. Flake calcium chloride is added, to the amount of 50 lb. of chloride per cubic yard of sand. This causes the ice to melt sufficiently to permit the particles of abrasive to become partially imbedded in it.

This method was first proposed by Mr. Tiney several years ago, before the annual meeting of the Highway Research Board, as noted on page 20 of the April (1932) issue of CONCRETE.

Heavily Reinforced Columns Develop Full Strength of Steel

THE Fritz Engineering Laboratory of Lehigh University, Bethlehem, Penna., has reprinted an article by Inge Lyse, research assistant professor of engineering materials, which was published originally in the July (1933) issue of *Civil Engineering*, under the heading of "Tests of Reinforced Concrete Columns."

The tests were designed as a means of studying the action of high percentages of longitudinal reinforcement, the quantity of such reinforcement having amounted to 1½, 6, 10½, 14½ and 17½ per cent.

Even with the higher percentages of reinforcement it was found that the longitudinal steel added its full yield-point strength to the column.

List of A. C. I. Standards

THE American Concrete Institute, 7400 Second Blvd., Detroit, Michigan, has issued a 29-page supplement to the *Journal* of the Institute, containing title and index pages for Vol. 29 *Proceedings*. The supplement also contains a list of A. C. I. standards, including full standards, tentative standards and proposed recommended practice regulations.

Subjects covered by these various documents include (1) concrete masonry units, (2) curb and gutter practice, (3) concrete pipe and drain tile, (4) reinforced concrete, (5) sidewalks and floors, (6) concrete roads, (7) surface finishes, and (8) miscellaneous items.

Census of Manufactures Report on Products Industry

THE Bureau of the Census, Department of Commerce, Washington, D. C., has issued a 9-page printed bulletin under the title of "Cement; Concrete Products." Six pages of the bulletin are devoted to an analysis and summary of the concrete products industry, particularly for the years 1925, 1927, 1929 and 1931. The remaining three pages are concerned with the manufacture of cement.

Copies of the bulletin may be obtained at 5 cents each from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Features of Concrete Masonry Code

Eight Regions to Elect Code Authority—C. M. A. Is General Trade Association—Cinder Unit Group to Govern Own Membership

THE final conference concerning the Code of Fair Competition for the Concrete Masonry Industry was held in Washington on November 1, 2 and 3, and participated in by the code committee of the Concrete Masonry Association as well as by representatives of the cinder unit group and one of the largest state associations. After working out all details with the NRA, the code was accepted as being truly representative of the industry. It was signed by the President on November 27.

Why Speed Was Essential

Ever since the work on a concrete masonry code was started—immediately upon assurance of the passage of the National Industrial Recovery Act in June—a great deal of work, time and money has been expended by those representing the industry. A code was filed on August 12. Then followed lengthy, but necessary, conferences among the groups involved, with frequent trips to Washington for the purpose of conferring with NRA officials.

It is gratifying to report that the code was developed fast enough (in spite of many problems involved), to place it among the early ones for public hearing, and that it was jumped ahead of almost 1,200 other codes now in progress. Speed of action appeared essential, particularly in view of the Government construction program to which all are looking for a substantial part of the business.

Principal Features Reviewed

It may be well to comment upon certain parts of the code, as it appears now, in its completed form, and mandatory upon the concrete masonry industry.

Article II—Definitions. Everyone engaged in the manufacture and sales of concrete masonry is a "member of the industry," as this term is used throughout the code. In other words all manufacturers come under the code, and are from now on subject to its provisions for wages, hours of labor, fair trade practice, and other essential features to be enforced by a "Code Authority."

Articles III, IV and V. These pertain to labor, and are self-explanatory. The responsible maker of concrete masonry has always treated his labor right, and there is nothing in these articles for him to worry about. The irresponsible manufacturer will either have to mend his ways or get out. The industry, of course, will closely watch other codes now in progress, to see that these close competitors are subject to similar labor provisions.

Article VI—Administration. As stated above, every maker of concrete masonry is now subject to this code. In order to have a voice in its administration, he must naturally share in the expenses (which will be small when shared by all), and he must take active part in electing the governing committees. These committees are responsible to the administrator, representing the NRA.

The chief governing body of the concrete masonry industry is called the "Code Authority" and is composed of eight members. It is elected by the various trade associations involved and recognized by the NRA in accordance with Section 4 of this article.

C. M. A. Is General Trade Association

In accordance with the concrete masonry code, the Concrete Masonry Association is the recognized general trade association of the industry. In addition, the cinder unit group has been established and its trade association will act in a similar manner within its group. The relative representation upon the "Code Authority" will be determined by the relative productive capacities represented. Other groups will undoubtedly be formed in accordance with the code—and they, too, will get their proper representation.

The code takes away none of the functions of state and local associations. It strengthens them, for behind them now is all the power and authority of the NRA. And guiding them in their work of administering the code in their states or cities is the National Concrete Masonry Association. These state and local associations (defined in the code as "regional" and "sub-regional") will be the backbone of code enforcement. To them will fall a new responsibility.

It is firmly believed that this administrative set-up is fair and equitable. The "Code Authority" will result from voting by regions as well as by plant capacity groups. It will enable smaller, definitely separate groups to have a voice. Through group committees, regional and sub-regional committees, it will co-ordinate details of administration that can not possibly be handled by one body.

A member, a region, or a group will always have recourse to the administrator of the NRA, or to the arbitration clause of Section 12 of this article.

Article VII—Trade Practices. It is the avowed purpose of the NRA to eliminate the "chiseler" from the industry—and it is the honest intention of every responsible manufacturer of this industry to help bring that about. The fair trade practices have been established accordingly, and it is up to the "Code Authority," with the backing of the NRA, to enforce them vigorously. Needless to say, every worthwhile member of the industry will help.

Section 2 of this article deals with the question of price. No attempt is made to fix price, but an effort is made to cut out the foolish practice of selling below cost, of not knowing what one's own cost is, and of cutting the throat of a fair competitor.

The foregoing is a brief review of some of the most essential provisions of the code. It will pay every manufacturer to read carefully the code itself, and to take prompt action, now that the code has become a law.

PWA Construction Projects Will Use Many Concrete Products

Kinds of Units Needed for Various Purposes—Columbus Plant Wins Huge Contracts for Concrete Sewer Pipe

THE concrete products industry is destined to play a definite part in the construction program of the Public Works Administration. The soundness of this assertion can be demonstrated in several ways—first, through an analysis of the nature of the construction projects favored by the PWA, and second, from recent news of the industry.

As to news of the industry, one of the most gratifying news items that ever has come from concrete products manufacturing circles came from Columbus, Ohio, on November 1, announcing the award of a contract, amounting to $153,000, to a concrete pipe manufacturing concern.

The company that obtained this contract is the Universal Concrete Pipe Company, which has plants in Columbus, Cleveland, Sandusky, Pittsburgh, Rochester and New Martinsville, W. Va. The contract in question was awarded to the Columbus plant. It calls for 8,700 lin. ft. of 84-in. concrete pipe, and 3,700 lin. ft. of 78-in. pipe, for the city of Springfield, Ohio, for use in a sewer construction project approved and partly financed by the PWA.

This is, as a matter of fact, the largest single contract ever booked by this manufacturer, and it followed closely on the heels of a similar award from another city, amounting to $72,000.

Many Other Products Needed

Concrete pipe is only one of many concrete products that will find a place in the PWA construction program. For example—

(1) Slum-clearance housing developments will require load-bearing block and tile, back-up and partition tile, floor filler tile, cast stone, floor and wall facing tile, fireplaces and mantels, laundry trays, incinerators, garbage boxes, garden furniture.

(2) Large-scale developments of single-family and two-family dwellings will utilize load-bearing concrete block and tile, back-up and partition tile, fireplaces and mantels, cast stone, roofing tile, garden furniture, laundry trays, septic tanks, incinerators, garbage boxes.

(3) Sewage systems and sewage disposal plants will utilize sewer pipe, manhole blocks, drain tile, and large precast wall and roofing slabs.

(4) Municipal improvements will supply a market for ornamental concrete street lighting poles, precast curb-and-gutter units, manhole blocks, precast crossing slabs, concrete piling.

(5) Waterworks improvements will need building block and tile, pressure pipe, precast roofing slabs, concrete piles.

(6) Public utility construction will require building block and tile, cast stone, precast roofing slabs, conduit tile, concrete poles for power transmission, telephone poles, and concrete piles.

(7) Highway construction will require concrete culvert pipe, drain tile, railway crossing slabs, precast curb-and-gutter units, lighting standards, fence posts, and concrete piling.

(8) Railways will utilize concrete cribbing units (for retaining steep earth slopes), precast crossing slabs, fence posts, concrete piles, large precast units for bridges and culverts.

Private Construction Work

Private construction work will, of course, utilize some of the various products enumerated above. This source of demand, now light, will be felt with increasing force as recovery progresses and spreads. This conclusion seems reasonable when the magnitude of the PWA program is considered, for it appears inevitable that a vast public works construction program will stimulate private construction.

Concrete Storm Sewers and Highway Structures Built in Winter

CONCRETE manhole blocks and concrete pipe storm sewers constituted a considerable part of the winter construction work on the extension of the Lincoln Park Outer Drive, in Chicago, during the past winter.

By completing all storm sewers in the newly filled area, and constructing two highway grade separations and a pedestrian underpass, it was possible to begin actual paving of the concrete roadway early in the spring of 1933.

Installing concrete pipe storm sewers and concrete block manholes was an important part of this winter construction program

This work stands as an excellent example of procedure on highway construction work under contract too late in the season to permit full completion. By doing all grading and building all drainage works and highway structures in the late fall and winter months, completion in the spring or early summer is made possible—and in the meantime employment is given to men who otherwise would be idle.

EDITORIAL

Support for Winter Construction

ELIMINATION of the traditional winter lag in both private and public construction, so that employment through the PWA program will not be interrupted, constituted one of the major objectives of the meeting of the governing and advisory boards of the Associated General Contractors of America, held in Washington on November 13 and 14.

It is well that this meeting was held, and that winter construction was given special attention. While no claims are being made that the A. G. C. was responsible for bringing light into the vision of the Public Works Administrator, it is significant that just about at the time of this meeting an announcement from Washington assured the nation that continuous work will be required on projects financed by the PWA.

Prior to this announcement, the PWA had been severely criticized for its seeming lack of interest in winter construction, evidenced by its failure to require a continuous-work clause in specifications.

Many contractors, more intent on making a profit next spring than on giving employment this winter, will find ways and means to delay work on contracts awarded to them; but a sincere effort on the part of PWA authorities and local public works officials will result in a large volume of winter construction which might, if the contractor were allowed to have his way, be postponed until spring.

Officials who display the necessary determination may count on the active support of the A. G. C., as well as that of the Portland Cement Association and similar organizations.

A Roll Call of Slacker States

SHALL we have a roll call of slacker states and state highway departments?

It was on November 10, or thereabouts, that Secretary Harold L. Ickes, administrator of the PWA, telegraphed to the governors of Illinois, Indiana, Michigan, Colorado, Kansas, Arkansas, Tennessee, Mississippi, Georgia, and Maryland, urging them to speed up their road-building programs under the allotments granted them out of the $400,000,000 fund provided in the National Industrial Recovery Act.

In the states named, Secretary Ickes announced, the amount of work placed under contract varied from 23.4 per cent in Maryland, to nothing at all in Georgia.

By way of contrast it was pointed out that the State of New York had awarded contracts for 67 per cent of its allotment of $22,330,000; that Maine had awarded contracts for 66 per cent of its allotment; and that Iowa and Nebraska had contracted for more than 50 per cent of theirs.

Taking all states combined, a detailed government report issued as of November 11 discloses that up to that date, 3,848 projects requiring an estimated expenditure of $219,000,000 had been approved. Contracts had been awarded on 2,842 of the approved projects, but only 1,653 were under construction.

In a word, only about one-fourth of the $400,000,000 fund had actually been put to work in the form of contracts under construction.

The same government report, presenting the record by states, discloses the worst offenders, though it must not be forgotten that much of the responsibility for delay can be thrown right back at Secretary Ickes because of his insistence that all projects must be approved in Washington.

But so far as the effect on employment is concerned, it matters little whether these meagre results in so many states are due to lack of energy in the state highway departments, or whether higher state officials are playing politics with the price of cement, or whether a part of the blame lies in Washington.

Wherever the responsibility rests, somewhere along the line public officials have been indifferent to human suffering and the welfare of the nation. With their own names safely on the public pay roll, they fail to see the urgent need for pushing construction programs to the utmost limit. They have not been willing to exert themselves to gain speedy results; and, as in Illinois, they have not been able to resist the temptation to play politics.

Concrete Goes on the Air

"CONCRETE GOES ON THE AIR" was the startling announcement that was given nationwide distribution on November 13, by the Portland Cement Association.

The announcement carried the gratifying news that the rapid-talking Floyd Gibbons would be on the air in the early evening of November 20 and 27, to tell the radio public of the plans and achievements toward making more winter work—more building—more concrete construction throughout the coming winter months.

Those who tuned in on the broadcasts—and who in the construction industry did not?—know that Floyd Gibbons made a glorious success of his assignment.

Promotional work conducted on this basis is constructive in the highest degree. It influences mass thought, that powerful force on which so much depends.

Architects, engineers and public officials should not fail to take advantage of this powerful aid in their efforts to push winter construction.

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HOW TO DO IT

Questions and Answers
Consultation and Comment

A department devoted to the solution of problems encountered in concrete work. Readers are welcome to add to or improve upon the suggestions printed and to submit their views for possible publication

Blend of Silica and Portland Cement

I have read with special interest your article in the October issue of CONCRETE, *entitled "Blend of Silica and Portland Cement Modifies Quality of Concrete," as well as an article along similar lines on pages* 15-16 *of your August issue.*

Will you kindly refer me to sources from which further information may be obtained on these silica blends?—R. B. K., Dorchester, Mass.

The complete report by R. W. Carlson and G. E. Troxell, from which the article on "Blend of Silica and Portland Cement" was abstracted, may be consulted in the 1933 *Proceedings* of the American Society for Testing Materials. The report was not preprinted prior to the A. S. T. M. annual meeting, where it was first presented. It is probable, therefore, that the report is not available in separate pamphlet form.

You are referred also to an article on page 30 of the April (1933) *Cement Mill Edition of* CONCRETE, by Dr. E. W. Lazell, head of the Chemical and Physical Laboratories, Portland, Oregon. That article published under the heading of "Puzzolan Admixture to Cement Aids Resistance of Concrete," explains the chemical reaction which occurs between the natural silicate in the puzzolana and the hydrated lime liberated during the hardening of concrete. These two combine to form an insoluble lime silicate which adds greatly to the resistance of concrete when attacked by ordinary water or by water containing dissolved sulphates.

Experimental Cement Kiln

I am making preparations to test the argillaceous limestone of this region as a raw material for cement. I have sufficient refractory brick and fuel oil to make a small experimental kiln and produce the temperatures required.

Can you tell me what size of kiln will be needed to burn one or two cubic feet of clinker at a time, and what methods might be employed to grind the clinker?—S. A. M.

The size of the furnace needed depends on the nature of the oil burners available. For burning one or two cubic feet of clinker at a time a furnace 3 ft. long, 2 ft. wide and 2 ft. high, inside measurements, might be satisfactory. Grinding can be accomplished with any equipment that produces the necessary fineness.

It is probable, however, that you could have this limestone tested at much less expense by shipping sample sacks of it to a firm of consulting engineers and having them test its value as a raw material for cement.

You should also consider the greatly overbuilt condition of the cement manufacturing industry before spending much money on this investigation. The very best raw material can not assure you a market for the finished

product when that market is already greatly over-supplied with cement manufacturing capacity.

Books and Pamphlets on Concrete

I am employed by a contractor who specializes in concrete construction, and I would like to obtain a list of books and pamphlets dealing especially with the making and using of concrete.

The list of books, consisting of a full-page advertisement of the Book Department of CONCRETE, describes the various books in sufficient detail to enable you to make a selection.

It is suggested, further, that you consult current and back numbers of CONCRETE, particularly the column headed "New Books and Pamphlets," in which you will find references to many publications of value to you. Among the publications briefly reviewed in that column are many bulletins issued by technical organizations and trade associations, copies of which can, in some cases, be obtained free of charge.

Other references to valuable current bulletins and reports may often be found in the items on the page headed "Progress—In a Page," appearing in every issue of CONCRETE.

Design of Concrete Pavements

In the highway department of a neighboring state I recently saw a large paper-covered book on "Design of Concrete Pavements," but I neglected to note the name of the publisher. Can you supply this information?—A. R. C., Jackson, Miss.

You are probably referring to a book of 48 pages, published in 1931 under the title of "The Design and Construction of Concrete Pavements," by the Portland Cement Association, 33 W. Grand Ave., Chicago. This is a useful book that should be in the hands of every highway engineer.

Your attention is invited also to a 16-page booklet on "Cement-Bound Macadam," published more recently by the same organization and reviewed on page 18 of the May (1933) issue of CONCRETE.

Knox Harding's Light-Weight Aggregate

Several years ago a light-weight concrete aggregate was developed by Knox Harding. Can you tell me the name of this material and the address of the company that produces it?—M. C. W., Newark, N. J.

The light-weight concrete aggregate to which you refer was taken over several years ago, for further development, by the W. F. MacGlashan Associates, Alhambra, Calif. This material, a burned shale or clay, is known by the trade name of Cel Sealed Aggregate. It was described and illustrated on page 34 of the February (1932) issue of CONCRETE.

Tank Linings

In your August number, on the page headed "How to Do It," you state that tanks are being lined with glass plates and acid-resisting cement. Can you give us the addresses of manufacturers of such glass linings and cements?—E. A. C., San Francisco, Calif.

A list of manufacturers of glass tank linings and acid-resisting cements is being forwarded to you.

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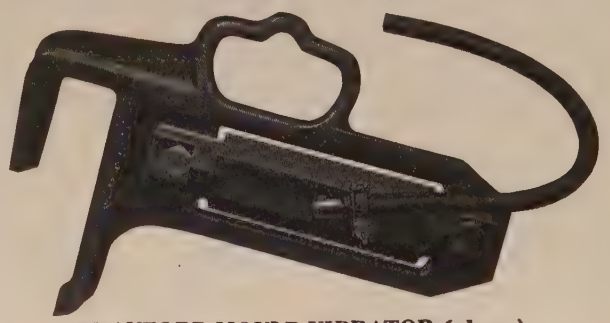

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Chapter XIV.—Forms for Tanks, Silos, Bins and Standpipes
Chapter XV.—Forms for Dams, Piers and Heavy Walls
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THE need that has for many years existed for one comprehensive text covering the entire subject of concrete form work from the viewpoints of designer, engineer, foreman, and workman has at last been met by this painstaking and complete book. It is written by Mr. A. E. Wynn of Matthys and Co., Binghamton, N. Y. Probably no one could be found who is a better authority on all phases of the subject, or who would devote greater care to the writing of such a book.

No expense has been spared to make this book absolutely thorough. It contains 320 pages, 219 illustrations, 12 folded inserts, and 11 design tables. It is strongly bound in cloth covers with title stamped in gold.

Although this book is issued by an English publisher, it is possible for American contractors and engineers to secure it without any formalities or undue expense. We have purchased an ample stock of the book, and will be able to make immediate shipment of it to any part of the United States upon payment of the price of

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ORGANIZATIONS

American Association of State Highway Officials; W. C. Markham, Executive Secretary, 1222-24 National Press Building, Washington, D. C.

Amercian Concrete Institute; Harvey Whipple, Secretary, 7400 Second Blvd., Detroit, Mich. Thirtieth annual convention, February 20-22, Royal York Hotel, Toronto, Canada.

American Concrete Pipe Association; M. W. Loving, Secretary, 33 West Grand Ave., Chicago.

American Road Builders' Association; Chas. Upham, Engineer-Director, National Press Building, Washington, D. C.

American Society of Civil Engineers; Geo. T. Seabury, Secretary, 33 West Thirty-Ninth St., New York City.

American Society for Testing Materials; C. L. Warwick, Secretary-Treasurer, 1315 Spruce St., Philadelphia, Pa.

Associated General Contractors of America; E. J. Harding, Managing Director, 222 Munsey Bldg., Washington, D. C.

Building Officials Conference of America; Wm. F. Hurd, Secretary, Room 203, City Hall, Indianapolis, Ind.

Cast Stone Institute; L. A. Falco, Secretary, Chapel St. and Blatchley Ave., New Haven, Conn.

Cement Institute; H. C. Lundborg, General Manager, 11 East 44th St., New York City.

Concrete Masonry Association; Jack Franklin, Secretary, 7071 Plankinton Bldg., Milwaukee, Wis.

Concrete Reinforcing Steel Institute; R. W. Johnson, Secretary, 333 North Michigan Ave., Chicago, Ill.

Engineering Institute of Canada; 2050 Mansfield St., Montreal, Quebec.

Highway Research Board; Roy W. Crum, Director, 2101 Constitution Ave., Washington, D. C.

Joint Committee on Standard Specifications for Concrete and Reinforced Concrete; F. R. McMillan, Secretary, 33 West Grand Ave., Chicago.

National Association for Better Housing; Henry A. Guthrie, Secretary, 59 East Van Buren St., Chicago, Ill.

National Board of Fire Underwriters; W. E. Mallalieu, General Manager, 85 John St., New York City.

National Concrete Burial Vault Association; J. H. Stuart, Secretary-Treasurer, Bremen, Ohio.

National Crushed Stone Association; J. R. Boyd, Secretary, 1735 14th Street, N. W., Washington, D. C.

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National Ready-Mixed Concrete Association; V. P. Ahearn, Secretary, 545 Munsey Bldg., Washington, D. C.

National Sand and Gravel Association; V. P. Ahearn, Executive Secretary, 545 Munsey Bldg., Washington, D. C.

National Slag Association; H. J. Love, Secretary-Treasurer, 1449 Leader Bldg., Cleveland, Ohio.

National Terrazzo and Mosaic Association; J. M. Fuhrman, Secretary-Treasurer, 524 Brook Street, Louisville, Ky.

New Jersey State Concrete Products Association; Horace W. Bush, President, Lyndhurst, N. J.

Northwest Concrete Products Association; W. P. Hews, Secretary-Treasurer, Yakima, Wash.

Portland Cement Association; Edward J. Mehren, President; William M. Kinney, General Manager, 33 West Grand Ave., Chicago.

Rail Steel Bar Association; H. P. Bigler, Engineering Secretary; Builders' Bldg., 228 N. La Salle St., Chicago, Ill.

Wire Reinforcement Institute; R. D. Bradbury, Director, National Press Bldg., Washington, D. C.

Wisconsin Concrete Products Manufacturers' Association, Inc.; L. E. Schwalbe, Secretary, Wauwatosa, Wis.

New Books and Pamphlets

Concrete Road Design

CONCRETE ROAD DESIGN, by Frank T. Sheets. Published by the Portland Cement Association, 33 W. Grand Ave., Chicago, Illinois. Paper cover, 61 pages, 6 by 9 in. Numerous tables and design charts.

This book is prepared for the use of the practicing highway engineer. It presents in simple and usable form the results of research and mathematical analyses, from which the designer may arrive at the most economical design of pavement meeting the requirements of predicted traffic.

The soundness of the design methods proposed is proved by its complete agreement with results obtained in the Bates (Illinois) road tests conducted under actual traffic conditions some years ago.

Copies of the book are available on request addressed to the publisher.

Reinforced Concrete Design

THE ELEMENTS OF REINFORCED CONCRETE DESIGN, by Haddon C. Adams. Published by Concrete Publications, Ltd., London, England. Cloth, 168 pages, 6½ by 9½ in., 100 illustrations, 11 design charts and 9 tables.

This is a complete course for the student of reinforced concrete design as well as for the man engaged in actual structural design work. The book is written in simple language, utilizing elementary mathematics and containing fully worked examples. It is complete in itself, containing a full discussion of the statics of structures, and showing by worked examples how any structure is supported.

Simply supported and continuous beams and slabs, and different types of columns and footings, are among the structural members covered. The author explains the action of earth pressure on retaining walls, and includes complete designs for retaining walls of the cantilever and counterfort types.

Nature of Puzzolanic Action

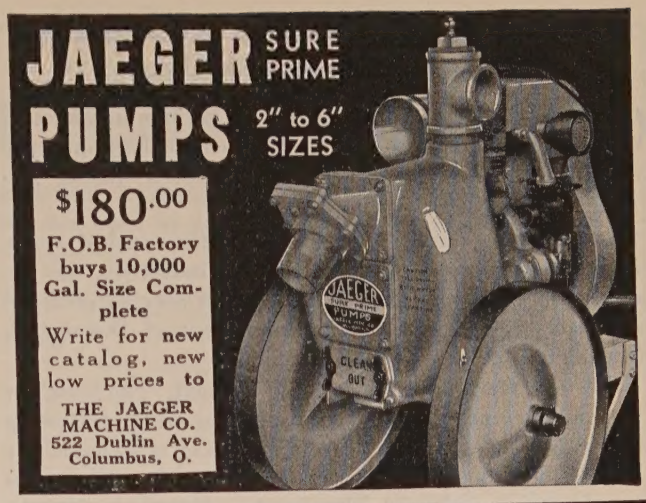
RECHERCHES SUR LA NATURE ET LA PROGRESSION DE L'ACTION POUZZOLANIQUE (Researches Concerning the Nature and the Progress of Puzzolanic Action), by R. Feret. Published as a 12-page reprint (in the French language) by *Revue des Materiaux de Construction*, 148 Boulevard de Magenta, Paris, France.

This reprint comprises extracts from articles published by Feret in the February and March (1933) issues of *Revue des Materiaux de Construction*. Individual sections of the reprint include a description of the methods of test, a study of various puzzolanic materials, and a study of hydraulic limes and cements.

Cracks in Concrete Pavements

STRUCTURAL EFFECT OF CRACKS IN CONCRETE PAVEMENTS. By R. D. Bradbury. Published by Wire Reinforcement Institute, Washington, D. C. Paper cover, 21 pages, 6 by 9 in.

An investigation by the Michigan State Highway Department, which included observations of the structural action at cracks in plain and in reinforced concrete pavements, comprises the basis for a considerable part of this pamphlet. In addition, excerpts are quoted from the findings of other investigators.



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Construction Codes Reaching Stage of Completion

CODES of fair competition for the various branches of the construction industry are reaching the final stage of approval, several having been approved during November.

Concrete Aggregates. The code for the crushed stone, sand and gravel, and blast-furnace slag industries, was approved on November 10. Printed copies may be obtained at 5 cents each from the Superintendent of Documents, Washington, D. C.

Concrete Masonry and Portland Cement. The code for the concrete masonry industry was approved, following final conferences early in November, and was signed by the President on November 27. The code for the cement manufacturing industry, likewise, was signed on November 27.

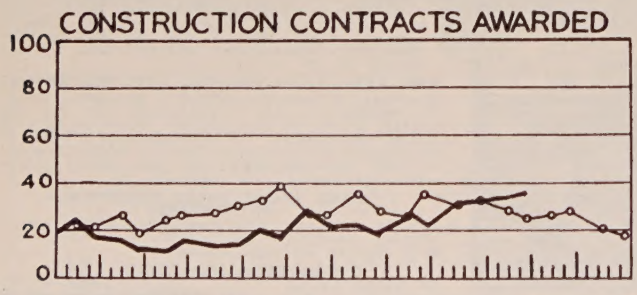
Concrete Pipe. November 28 was set as the date for the routine public hearing on the code for the concrete pipe manufacturing industry. It is sponsored by the American Concrete Pipe Institute, claiming to represent 86 per cent of the industry.

Concrete Floor Treatments. The code drawn up for a group of industries producing materials such as waterproofings, damp-proofings, caulking compounds, and concrete floor treatments, was granted a public hearing on November 3, and was signed on November 27.

Industrial Advisors. Additional industrial advisers appointed include W. T. Chevalier, of the McGraw-Hill Publishing Company, as adviser for the ready-mixed concrete industry. A. E. Lindau, consulting engineer, Chicago, acts in a similar capacity for the steel reinforcement industry.

Construction Continues Upward Climb

An encouraging upward tilt continues in the construction curve for 1933, shown in the diagram here reproduced, taken from the weekly supplement to the survey of current business issued by the United States Department of Commerce.



In this diagram the heavy line represents the volume of construction contracts for 1933, while the lighter line is for 1932, both compared on a percentage basis with the period from 1923 to 1925, inclusive.

Highway Research Board Annual Meeting

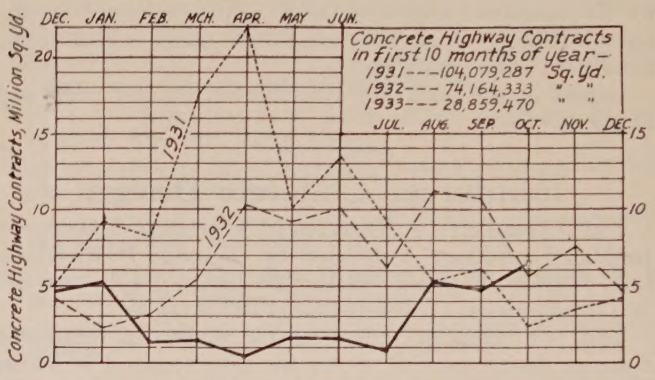
The thirteenth annual meeting of the Highway Research Board of the Division of Engineering and Industrial Research will be held in Washington, D. C., at the building of the National Academy of Sciences and National Research Council on Thursday and Friday, December 7 and 8, 1933.

Finance, highway transportation economics, highway design, materials and construction, maintenance, and highway traffic and safety, are subjects to be discussed. Roy W. Crum is director.

Concrete Highway Contracts Move Up in October

Contracts for concrete road construction awarded in the month of October reached an encouraging figure, according to reports compiled by the highways bureau of the Portland Cement Association.

The October figure of 6,409,092 sq. yd. is the highest monthly total for this year, and it discloses the continuation of the revival which first appeared in August. It exceeds by 13 per cent the yardage awarded in October, 1932, and indicates that the PWA highway construction program has at last taken hold.



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Agricultural Engineers Meet in Chicago

THREE divisions of the American Society of Agricultural Engineers will hold technical meetings at the Stevens Hotel, Chicago, on December 4, 5 and 6.

The program of the farm structures division is scheduled to hold forenoon and afternoon sessions on December 4 and 5.

From the Patent Office

By J. KAPLAN
Patent Attorney, Washington, D. C.

Concrete mixer: Frederick E. Mascetti and Americus D. Bruno, Torrington, Conn. U. S. Pat. 1,921,685, Aug. 8, 1933.—This mixer comprises a rotary hollow drum having inlet and outlet openings, the drum being divided into two compartments by a diaphragm. Concrete is prevented from falling back from the second to the first compartment.

Concrete road joint: John N. Heltzel, Warren, Ohio. U. S. Pat. 1,921,185, Aug. 8, 1933.—This invention provides an improved joint-producing apparatus, and method of operating it, and the means for finishing the concrete on opposite sides of the joint. See also U. S. Pat. 1,921,081, Aug. 8, 1933.

Low-soluble cement: Eugene L. Chappel, Pittsburgh, Penna. U. S. Pat. 1,916,157, June 27, 1933.—This cement is a mixture of about 33 per cent of portland cement and 67 per cent of cupola slag, the slag containing substantially from 25 to 30 per cent calcium oxide, 4 to 16 per cent ferric oxide, 6 to 12 per cent alumina, and 45 to 54 per cent silica.

BOOKS On Concrete

The books listed below have been carefully selected by our editorial staff as useful to those engaged in making concrete in all its various forms. Prices are cash in advance and include postage.

DESIGN AND CONSTRUCTION OF FORM WORK FOR CONCRETE STRUCTURES. By A. E. Wynn. 312 pages, 219 ills., 12 folded inserts and 11 design tables. Cloth bound, stamped title in gold. Price $6.00

"Wynn's Book" is a phrase commonly known to engineers, designers, and foremen, and is heard wherever concrete construction is under way. This book covers every phase of forms for concrete construction, and is fully and completely supplemented with many significant illustrations, tables and drawings and printed on a superior grade of enameled paper.

CONCRETE CONSTRUCTION MADE EASY. By Leslie Turner and Albert Lakeman. 113 pages, 65 illustrations, 16 tables. Cloth bound. Price $2.00

A practical book that solves problems in the design and erection of any type of concrete structure. Full designs with tables and all necessary information for building of foundations, walls, columns, floors, roofs, staircases, beams, water tanks, retaining walls, lintels, formwork, saw-tooth roofs, etc. A mine of information to the novice and a fruitful source of advice for the experienced. Written clearly and plainly.

MANUFACTURE AND USES OF CONCRETE PRODUCTS AND CAST STONE. By H. L. Childe. 354 pages. 265 illustrations. Color plates. Photographs. Completely rewritten and enlarged. Price $3.00

Deals with problems of how to: use dry mixes for architectural concrete; minimize crazing and efflorescence; design all kinds of molds; select materials; grade and proportion aggregates, regulate mixing, and govern curing; use color in concrete; manufacture columns, cornice posts, curb, blocks and slabs, brick, roofing tile, steps, sills, lintels and edgings, balustrades, sundials, bird-baths, lettered panels, ornamental work, etc. This new 1930 edition simplifies every phase of manufacture of concrete products and cast stone of every description for every purpose.

BASIC PRINCIPLES OF CONCRETE MAKING. By Franklin R. McMillan, Director of Research, Portland Cement Association.

The author has culled the essentials out of a mass of scientific data on this subject and presents them with force and directness in this book. He shows the effects of quality of material, of proportioning, mixing, working and curing on the finished concrete.

The importance of variable mixes; tests for permeability; how to obtain strength, durability and watertightness; effective ratios; importance of proper construction methods—these and many other vital topics are discussed fully and authoritatively.

The book represents not only extensive accumulated knowledge, but also wide practical experience in the field and laboratory. It is an enlargement and revision of a series of notable articles on concrete mixing by Mr. McMillan published in 1929.

Ninety-nine pages, 6x9½, 32 illustrations and tables. Postpaid. Price $2.00

CONCRETE MONUMENTS, MAUSOLEUMS AND BURIAL VAULTS. By A. A. Houghton. 65 pages, illustrated. Paper bound. Price $.75

The molding of concrete monuments to imitate the most expensive cut stone is explained in this treatise, with working drawings of easily built molds. Cutting inscriptions and designs is also fully treated.

***MOLDS FOR CAST STONE AND CONCRETE.** By F. Burren and G. R. Gregory. Heavy board cover, 79 pages, 11 by 7¼ in.; 44 full page illustrations. Price $1.25

Detailed working drawings for the practical mold maker, covering a wide range of concrete and cast stone products. Drawings supply the necessary information, and brief descriptions are given in each case.

A lot of good information, not only for cast stone manufacturers, but for makers of special products made of ordinary concrete, such as fence posts, chimney caps and pots, well linings, laundry tubs, etc.

***GENERAL ENGINEERING HANDBOOK.** By Charles Edward O'Rourke and 29 associates. Flexible cover; 921 pages, 5 by 8 in., numerous tables, diagrams and illustrations. Price $4.00

This book assembles a great amount of fundamental engineering data in usable form. 31 separate sections deal with as many specific branches of engineering.

Of particular interest to engineers who specialize in the use of concrete as a structural material are sections devoted to "Highway," by Thomas R. Agg; "Reinforced Concrete Structures," and "Stresses in Framed Structures," by Charles Edward O'Rourke; "Engineering Materials," by Herbert H. Scofield; "Foundations," by Roland P. Davis; and "Mechanics," by Alfred P. Poorman.

REINFORCED CONCRETE CONSTRUCTION. By George A. Hool, Professor of Structural Engineering, University of Wisconsin. University of Wisconsin Extension Series.

Vol. I—Fundamental Principles. Third Edition. 380 pages, 6x9, 139 illustrations, 18 tables, 28 diagrams $3.50

Vol. II—Retaining Walls and Buildings. Second Edition. 700 pages, 6x9, illustrated $6.00

Vol. III—Bridges and Culverts. 688 pages, 6x9, over 600 illustrations, 41 plates $6.00

***CONCRETE ENGINEERS MANUAL.** By Samuel Baker and A. DeGroot. Cloth, 401 pages, 5 by 7½ in., numerous drawings, charts and tables. Price $3.00

This volume is intended as a textbook for students of concrete engineering, and as a reference book for designers, foremen, inspectors, and others involved in the design of concrete structures and in the making and placing of concrete.

The book contains a complete description of the modern methods of proportioning concrete mixtures, mixing and placing concrete and steel, and providing waterproofing. Mathematical tables and the fundamental principles of mathematics and mechanics of materials, as applied to reinforced concrete designs, are included.

Among other subjects treated in individual chapters are form work, foundations, design of retaining walls, and estimating concrete work.

CEMENT CHEMISTRY IN THEORY AND PRACTICE. By Prof. Dr. Hans Kuhl, Director of the Institute for Cement Research, Berlin. Translated into English by J. W. Christelow, B.Sc. 64 pages, 6 by 9, cloth cover. Illustrated with a number of halftones and diagrams. Price $2.50

An authoritative book on the chemistry of cement, a translation of a series of lectures delivered by Dr. Kuhl in Moscow, at the special request of the Soviet government. The author presents the most up-to-date knowledge of the subject in simple language. The translator is one who knows his subject very thoroughly. The result is a concise record of modern research on the manufacture and setting of cement.

CONTENTS

1. The development of Cement Research.
2. The Theory of Cement Burning.
3. The Constitution of Portland Cement Clinker.
4. The Problem of Hardening and Its Significance in Cement Research.
5. The Chemistry of High-Strength Cements.
6. The Technical Aspect of High-Strength Cements.

PRE-CAST CONCRETE FACTORY OPERATION. By H. L. Childe, Editor, "Concrete Building and Concrete Products" (England). 190 pages, 5½x9, illustrations and layouts. Price $2.00

Complete descriptions of the plant layouts, equipment, methods, and processes of 20 English manufacturers, large and small. Includes the whole range of pre-cast units from the largest cast stone and roofing tile and plain block plants to the small producers of miscellaneous products.

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*Newly listed.

Book Department of CONCRETE, 400 West Madison Street, Chicago, Ill.

EQUIPMENT AND MATERIALS

New Product

Dacene, developed and marketed by the Dewey and Almy Chemical Company, of Cambridge, Mass., when used in the proportion of one pound to a barrel of cement (or ¼ of 1 per cent) is said to have a marked effect on the concrete mix compared with the same mix not containing Dacene. The company claims the slump or fluidity is increased, the strength is greater at all ages and that the early strengths are much greater.

The increase in the slump or fluidity permits a decrease in the amount of mixing water, resulting in a decrease in the amount of water per bag of cement and accordingly an increase in strength in compliance with the water ratio law.

The producers also claim Dacene has an unusual effect where pigments are used —that Dacene not only nulifies the usual loss of strength attendant upon the use of pigment, but actually causes an increase of strength as though no pigment were present—and that further, the same intensity of color is realized with less pigment than would ordinarily be required.

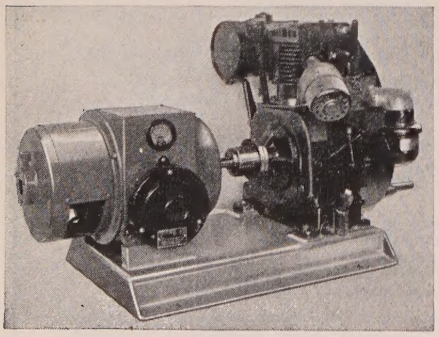
Dacene is sold as a 50 per cent water solution, by weight, and is also available as a solid. Samples are sent upon request.

●

Lighting Plants

The small, heavy duty line of lighting units recently perfected by the Harnishfeger Corporation, consists of a one- or two-cylinder gasoline engine directly coupled to a compound wound, continuous generator. Push button or manual starting is available.

Capacities range from 400 watts to 3



Harnischfeger Lighting Unit

kw. generating 35 or 120 volts direct current, the manufacturers say. Greater capacities are provided for by four- and six-cylinder gasoline generator sets with a current range of 1½ to 60 kw.

In addition to these gasoline driven sets, diesel power is also available.

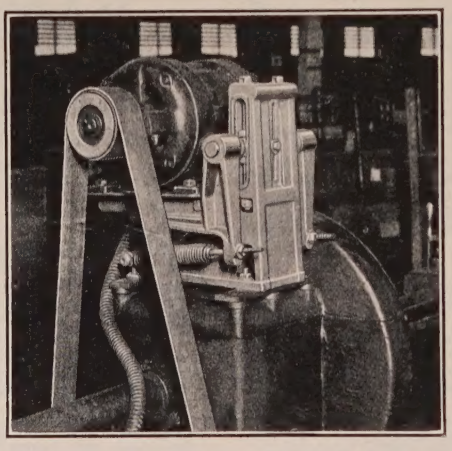
Features claimed for the line are high reserve capacity, economical operation, simplified design and continuous non-flickering current.

●

New Drive Motor Bases

Two new products have been announced by the Rockwood Mfg. Co. of Indianapolis, Indiana. They are the Rockwood vertical drive motor base and the Rockwood ceiling drive motor base.

The vertical drive base is said to provide for and maintain correct belt tension on both pulleys. It differs from the standard horizontal drive base in that the force producing belt tension is derived from coiled springs rather than from the weight



One of the Rockwood motor bases

of the motor. Otherwise in both principle and operation it is much the same.

When the motor is located above the driven pulley, the springs are adjusted to support the entire motor weight plus the necessary belt tension.

When the motor is located below the driven pulley, the springs are adjusted to support only that portion of the motor's weight not needed to provide belt tension. The ceiling drive base is quite similar to the standard base, they say, excepting that it has special hanger arms which suspend the motor horizontally, and give greater clearance from the ceiling.

●

Oil Engines

The Northwest Engineering Company, Chicago, now offers an oil engine on shovels, cranes and draglines with the first cost said to be very little above that of a gasoline engine, the simplicity of a gasoline engine, no injectors or fuel pumps, no destructive high pressures, and lower fuel costs.

Detailed information may be had for the asking.

Industrial Literature

Specifications for Acqua-Pruf

Specifications for Acqua-Pruf, a liquid integral waterproofing compound for concrete, are included in a printed folder recently issued by *Acqua-Pruf, Inc.*, of Newark, N. J.

Tests of compressive strengths are available, the producers say, from recognized laboratories and show early, as well as continued, increasing strength curves.

Acqua-Pruf is being featured as an anti-freeze—because the chemical reaction generates heat sufficiently, according to the makers, for placing and setting at 10 degrees above zero. Below 20 degrees, both water and aggregates should be heated.

Johnson & Co. are Chicago distributors.

●

Dowflake

The Dow Chemical Company of Midland, Michigan, has just issued a folder describing "Dowflake" calcium chloride and setting forth its qualifications either for surface curing or as an admixture. Their booklet "How to Cure Concrete" is said to contain considerable data and will be sent upon request.

Manufacturers' News

Builds Batching Installation

The Neff & Fry Company, of Camden, Ohio, is building and installing for the Hilltop Builders Supply Company, Cincinnati, Ohio, a unique batching installation.

The actual batching equipment is of 20,000 lbs. capacity, which will charge mixing trucks and batch trucks for paving as well as other types of concrete work, and at the same time can be used for net weighing of bulk loading up to 15,000 lb. of any one particular aggregate and taking care of six different aggregates, as well as two different cements. This is all handled in such a way that the trucks themselves do not have to be weighed, and is so arranged that one, two or three batching jobs may be going on, using the various aggregates stored without any lost time between the time of batching into one truck and another. The controls for the cement and aggregate are mounted in such a way that they are all controlled from a space approximately 2 ft. square.

The scales are of charging beam type. There are ten beams, all in connection with the springless indicating dials.